CLAIMS

1. In a network of Bluetooth protocol devices, a method for establishing communications comprising:

broadcasting a piconet beacon frequency;

monitoring to receive the piconet beacon frequency; and

in response to receiving the piconet beacon frequency, establishing communications with the piconet.

2. The method of claim 1 further comprising:

prior to broadcasting the piconet beacon frequency, establishing a piconet with a master device; and

wherein broadcasting a piconet beacon frequency includes the master device broadcasting at a first predetermined frequency $f(k_B)$ from the plurality of spread spectrum transmission frequencies.

3. The method of claim 2 wherein broadcasting a piconet beacon frequency includes the master device broadcasting its Bluetooth address (BD_addr) and clock (CLK) information.

4. The method of claim 3 wherein receiving the piconet beacon frequency includes an inquiring device receiving the BD_addr and CLK information of the master device.

5. The method of claim 4 wherein receiving the piconet beacon frequency includes the inquiring device receiving the BD_addr

and CLK information of the master device in a first downlink frequency hop synchronization (FHS) packet.

6. The method of claim 5 wherein establishing communications with the piconet includes the inquiring device deriving the master device frequency hopping sequence from the master device BD_addr and master device CLK information.

7. The method of claim 6 wherein establishing communications includes, following the receiving of the first downlink FHS packet by the inquiring device, transmitting a first uplink FHS packet from the inquiring device to the master device.

8. The method of claim 7 wherein transmitting a first uplink FHS packet from the inquiring device to the master device includes transmitting the inquiring device BD_addr in the FHS packet payload.

9. The method of claim 8 wherein transmitting a first uplink FHS packet from the inquiring device to the master device includes transmitting a FHS packet access code (AC) derived from the master device BD_addr.

10. The method of claim 9 wherein establishing communications includes, following the receiving of the first uplink

FHS packet by the master device, transmitting a second downlink FHS packet from the master device to the inquiring device.

11. The method of claim 10 wherein transmitting a second downlink FHS packet from the master device to the inquiring device includes transmitting an active member address (AM_addr) in the FHS packet payload.

12. The method of claim 11 wherein transmitting a second downlink FHS packet from the master device to the inquiring device includes transmitting a FHS packet access code derived from the inquiring device BD_addr.

13. The method of claim 12 wherein establishing communications includes, following the receiving of the second downlink FHS packet by the inquiring device, transmitting an ID packet from the inquiring device to the master device, acknowledging the receipt of the AM_addr.

14. The method of claim 13 wherein establishing communications includes:

following the receiving of the ID packet by the master device, transmitting a POLL packet from the master device to the inquiring device;

in response to receiving the POLL packet, transmitting a NULL packet from the inquiring device to the master device; and

establishing higher level protocols between the master device and the inquiring device.

15. The method of claim 14 wherein establishing higher level protocols between the master device and the inquiring device includes the inquiring device becoming a piconet slave device.

16. The method of claim 15 wherein broadcasting a piconet beacon frequency includes the master device broadcasting the first downlink FHS packet in the slot at frequency $f(k_B)$;

wherein transmitting the first uplink FHS packet includes:

the inquiring device randomly selecting a number m, where m is a number between 1 to 8 for the contention period of 15 slots;

the inquiring device transmitting the first uplink FHS packet in the slot at frequency $f(k_B +(2m-1))$;

wherein the master device transmits the second downlink FHS packet in the slot at frequency $f(k_B +2m)$; and,

wherein the inquiring device transmits the ID packet in the slot at frequency $f(k_B +(2m+1))$.

17. The method of claim 16 wherein the inquiring device randomly selecting a number m includes randomly selecting a number m between 1 to 8; and,

the method further comprising:

establishing a contention period equal to fifteen slots; and

the master device waiting (2m-1) slots from the broadcast of the piconet beacon frequency at frequency $f(k_B)$ to receive a first uplink FHS packet from an inquiring device.

18. The method of claim 16 further comprising:

establishing a contention period equal to fifteen slots; and

the master device waiting a maximum of fifteen slots from the broadcast of the piconet beacon frequency at frequency $f(k_B)$ to receive a first uplink FHS packet from an inquiring device.

19. The method of claim 1 further comprising:

establishing a piconet with a master device; and

wherein broadcasting a piconet beacon frequency includes the master device broadcasting at a first plurality of predetermined beacon frequencies from the plurality of spread spectrum transmission frequencies;

wherein monitoring for the piconet beacon frequency includes monitoring the first plurality of beacon frequencies; and

wherein establishing communications with the piconet includes establishing communications in response to receiving one of the plurality of piconet beacon frequencies.

20. In a network of Bluetooth protocol devices, a method for a master device to permit the establishment of piconet communications comprising:

broadcasting a piconet beacon frequency at a first predetermined frequency $f(k_B)$ from the plurality of spread spectrum transmission frequencies; and,

receiving a first uplink FHS packet from an inquiring device, in response to broadcasting the piconet beacon frequency.

21. The method of claim 20 wherein broadcasting a piconet beacon frequency includes the master device broadcasting its BD_addr and CLK information in a first downlink FHS packet.

22. The method of claim 21 wherein receiving a first uplink FHS packet from the inquiring device includes receiving the inquiring device BD_addr in the FHS packet payload and a FHS packet access code (AC) derived from the master device BD_addr.

23. The method of claim 22 further comprising:

following the receiving of the first uplink FHS packet by the master device, transmitting a second downlink FHS packet from the master device to the inquiring device.

24. The method of claim 23 wherein transmitting a second downlink FHS packet from the master device to the inquiring device includes transmitting an AM_addr in the FHS packet payload.

25. The method of claim 24 wherein transmitting a second downlink FHS packet from the master device to the inquiring device includes transmitting a FHS packet access code derived from the inquiring device BD_addr.

26. The method of claim 25 further comprising:

following the transmission of the second downlink FHS packet by the master device, receiving an ID packet from the inquiring device acknowledging the receipt of the AM_addr.

27. In a network of Bluetooth protocol devices, a method for an inquiring device to establish communications with a piconet, the method comprising:

monitoring to receive the piconet beacon frequency at a first predetermined frequency $f(k_B)$ from the plurality of spread spectrum transmission frequencies; and

in response to receiving the piconet beacon frequency, transmitting a first uplink frequency hop synchronization (FHS) packet to establish communications with the piconet.

28. The method of claim 27 wherein receiving the piconet beacon frequency includes receiving a master device Bluetooth address (BD_addr) and clock (CLK) information in a first downlink FHS packet.

29. The method of claim 28 further comprising:

deriving the master device frequency hopping sequence from the master device BD_addr and master device CLK information.

30. The method of claim 29 wherein transmitting a first uplink FHS packet from the inquiring device includes transmitting the inquiring device BD_addr in the FHS packet payload and a FHS packet access code (AC) derived from the master device BD_addr.

31. The method of claim 30 further comprising:

following the transmission of the first uplink FHS packet, receiving a second downlink FHS packet from the master device including an active member address (AM_addr) in the FHS packet payload and a FHS packet access code derived from the inquiring device BD_addr.

32. The method of claim 31 further comprising:

following the receiving of the second downlink FHS packet by the inquiring device, transmitting an ID packet to the master device, acknowledging the receipt of the AM_addr.

33. A system for establishing communications in a network of Bluetooth protocol devices, the system comprising:

a master device broadcasting a piconet beacon frequency;

at least one inquiring device monitoring the piconet beacon frequency, and in response to receiving the piconet beacon frequency, establishing communications with the master device.

34. The system of claim 33 wherein the master device broadcasts the piconet beacon frequency at a first predetermined frequency $f(k_B)$ from among the plurality of spread spectrum broadcast frequencies.

35. The system of claim 33 wherein the master device broadcasts the piconet beacon frequency at a first plurality of predetermined frequencies from among the plurality of spread spectrum broadcast frequencies; and,

wherein the inquiring device monitors the first plurality of piconet beacon frequencies and, in response to receiving one of the piconet beacon frequencies, establishes communications with the master device.

36. The system of claim 34 wherein the master device broadcasts its Bluetooth address (BD_addr) and clock (CLK) information on the piconet beacon frequency.

37. The system of claim 36 wherein the inquiring device receives the BD_addr and CLK information of the master device in a first downlink frequency hop synchronization (FHS) packet broadcast on the piconet beacon frequency.

38. The system of claim 37 wherein the inquiring device derives the master device frequency hopping sequence from the master device BD_addr and CLK information received on the piconet beacon frequency.

39. The system of claim 38 wherein the inquiring device transmits a first uplink FHS packet to the master device following the reception of the first downlink FHS packet.

40. The system of claim 39 wherein the inquiring device transmits a first uplink FHS packet to the master device including the inquiring device BD_addr in the FHS packet payload.

41. The system of claim 40 wherein the inquiring device transmits a first uplink FHS packet to the master device including a FHS packet access code (AC) derived from the master device BD_addr.

42. The system of claim 41 wherein the master device transmits a second downlink FHS packet to the inquiring device following the reception of the first uplink FHS packet.

43. The system of claim 42 wherein the master device transmits a second downlink FHS packet to the inquiring device including an active member address (AM_addr) in the FHS payload.

44. The system of claim 43 wherein the master device transmits a second downlink FHS packet to the inquiring device including a FHS packet access code derived from the inquiring device BD_addr.

45. The system of claim 44 wherein the inquiring device transmits an ID packet to the master device following the reception of the second downlink FHS packet, acknowledging the receipt of the AM_addr.

46. The system of claim 45 wherein the master device transmits a POLL packet to the inquiring device following the receipt of the ID packet by the master device;

wherein the inquiring device transmits a NULL packet to the master device in response to receiving the POLL packet; and,

wherein the master device establishes higher level protocols with the inquiring device following the receipt of the NULL packet.

47. The system of claim 46 wherein the inquiring device becomes a piconet slave device following the establishment of higher level protocols with the master device.

48. The system of claim 47 wherein the master device broadcasts the first downlink FHS packet in the slot at frequency $f(k_B)$;

wherein the inquiring device randomly selects a number m, and transmits the first uplink FHS packet in the slot at frequency $f(k_B + (2m-1))$;

wherein the master device transmits the second downlink FHS packet in the slot at frequency $f(k_B + 2m)$; and,

wherein the inquiring device transmits the ID packet in the slot at frequency $f(k_B + (2m+1))$.

49. The system of claim 48 in which a contention period equal to fifteen slots is established;

wherein the inquiring device randomly selecting a number m includes randomly selecting a number m between 1 to 8; and,

wherein the master device waits (2m-1) slots from the broadcast of the piconet beacon frequency at frequency $f(k_B)$ to receive a first uplink FHS packet from an inquiring device.

50. The system of claim 49 in which a contention period equal to fifteen slots is established;

wherein the master device waits a maximum of fifteen slots from the broadcast of the piconet beacon frequency at frequency $f(k_B)$ to receive a first uplink FHS packet from an inquiring device.

51. A Bluetooth protocol piconet master device comprising:

a transmitter broadcasting a piconet beacon frequency; and,

a receiver to receive communications from an inquiring device monitoring the piconet beacon frequency to establish communications with the master device.

52. The master device of claim 51 wherein the transmitter transmits the piconet beacon frequency at a first predetermined frequency $f(k_B)$ from among the plurality of spread spectrum broadcast frequencies.

53. The master device of claim 52 wherein the transmitter transmits the master device Bluetooth address (BD_addr) and clock (CLK) information in a first downlink frequency hop synchronization (FHS) packet broadcast on the piconet beacon frequency.

54. The master device of claim 53 wherein the receiver receives a first uplink FHS packet, including the BD_addr of the inquiring device following the transmission of the first downlink FHS packet.

55. A Bluetooth protocol device inquiring to establish communications with a piconet, the inquiring device comprising:

a receiver having an input to monitor and receive a piconet beacon frequency; and

a transmitter having an output to establish communications with a piconet master device in response to receiving the piconet beacon frequency.

56. The inquiring device of claim 55 wherein the receiver monitors the piconet beacon frequency at a first predetermined frequency $f(k_B)$ from among the plurality of spread spectrum broadcast frequencies.

57. The inquiring device of claim 56 wherein the receiver receives the master device Bluetooth address (BD_addr) and clock (CLK) information in a first downlink frequency hop synchronization (FHS) packet broadcast on the piconet beacon frequency.

58. The inquiring device of claim 57 wherein the inquiring device derives the master device frequency hopping sequence from the master device BD_addr and CLK information received on the piconet beacon frequency.

59. The inquiring device of claim 58 wherein the transmitter transmits a first uplink FHS packet, including its BD_addr, to the master device following the reception of the first downlink FHS packet.